

LEE

A Comparison of the Findings of the Periodic Medical Inspections of the
School Health Service with those of certain Medical Boards, with a discussion
of some problems of Medical Administration

Part I

Introduction and Account of the "Pilot" Study

Introduction

Medical examinations can be of two kinds - those made at the request of the patient because he feels that there is something wrong with him, and those made to check that the apparently fit subject is not in fact suffering from some disease. In this study the working of two systems of the latter type are compared. Under both of them individuals without apparent disease are examined routinely at certain stages of their careers. The two systems are the periodic medical inspections of the School Health Service, and the examinations made before men are accepted into the Armed Forces.

The method used in this study has been to lay side by side the findings of each type of examination, where the same man has been subjected to both. This has been done for a series of men, and the degree of agreement of the two systems assessed. The primary measurement is the proportion of the completed sets of records which show a major disagreement between the results of the two examinations. This proportion of disagreements was found to be high. There are broadly two sorts of reasons for such discrepancies. Either the difference in time of the two examinations has permitted old diseases to heal and new ones to appear, or there is a difference in the effectiveness of the two types of examination. The relative importance of these two kinds of explanation of the observed discrepancies is discussed. The administrative aspects of the



findings, and the general problem of the use of information in the organisation and control of medical services is commented upon.

The experiments to be described followed each other. Each was designed within the limits of the available resources to fill in the uncertainties and amplify the conclusions of the preceding ones. Therefore the material is presented in the form of an approximately consecutive narrative.

The "Pilot" Study

Since 1939 the young men of this country have been required to serve for a period of time in the armed services, unless they have been excluded for certain definite reasons, or were medically unfit. In order to separate those who are fit from those who are not, men who are otherwise eligible for service are examined by Medical Boards appointed by the Ministry of Labour and National Service. At the present time about twenty per cent of those examined are not considered to be fit for service. No official analysis of the causes of rejection is published, and, as it seemed that this might be a valuable source of information about the health of the men of this age, several studies have been made of the findings of these Boards. (Webb, Hewitt and Stewart, 1953 and 1955a, b, c, d. Webb, 1955a, & b. Clements & Pickett, 1952. Clements, 1953. Martin, 1949) I have also made a study along these lines (Lee, 1955a, b, & c). The collection of data for this study, which was in the form of transcriptions of the findings of these Boards in certain areas, was in progress during the winter of 1953-4. It seemed at the time that it would be worthwhile to compare these records with those dealing with the same men which had been collected by other services. The examinations made by the Medical Boards were separated from the latest ones of the school doctors by an interval that was usually about three years. These were often the first years of working life, and a comparison between the records might show changes in the health of the men over this period.

Thus the records of the School Health Service provided obvious opportunities for this kind of enquiry. The Youth Employment Service was considered as well, and a little work was done upon this, but not followed up.

Besides the general interest of this comparison, another factor directed attention to the records of the school doctors. In the making of the decision that a man is fit or unfit for National Service, the single clinical examination of the Medical Board is crucial. The Boards may, of course, make use of the advice of consultants and the men's family doctors, and this is frequently done. But before this assistance is sought, the defect has to be recognised or the significant history elicited. For this the Boards have very little routine help, apart from a simple chemical examination of the man's urine, the result of a Mass Miniature Radiography examination in most cases, and the man's score in the test of intelligence which is part of the service selection procedure. Occasionally men arrive with certificates from their own doctors, but this is not common, and is usually confined to those with serious defects. Thus a very great responsibility rests upon the doctors who make up these Medical Boards. By contrast, the records of the School Health Service usually include the results of three clinical examinations, separated by long intervals, plus the fruits of the observation of the child over a period of ten years at least by nurses and intelligent lay people. Further, there should be accounts of any major episodes in the child's medical history. Thus it was possible that the routine transmission of the School Health Service record to the Medical Board might improve the selectivity of their examination to an extent that would justify the expense of the clerical work involved.

With these considerations in mind, the Local Education Authorities were approached of two areas where men had lived whose records of pre-National Service medical examinations were available. The co-operation of these

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Authorities was readily given, as was that of every Authority which was approached during this and the subsequent studies. The School Health Service records of the men whose other records were already held were extracted, and the two sets put side by side for comparison.⁽¹⁾ As has been suggested above, one of the purposes which we had in mind at this time was to see if the information on the School Health Service record card would, if it had been available to the Medical Boards, have led to a substantial extra number of rejections. Therefore in this "pilot" study the records of men of all grades of fitness were included - those unfit for National Service, to trace the history of their defects, and those fit, to see if they would still have been considered so if the school records had been available.

The results of this association of two sets of records were quite striking. 46 were rejected for National Service in the series, and of these the defect that had caused the rejection was only noted on the School Health Service records of 25. On the other hand, of the 83 men⁽²⁾ who were fit enough to serve, only one was found to have a significant defect recorded by the School Health Service which was not noted by the Board.⁽³⁾ It was felt that this evidence did not

(1) This "pilot" study was made by a Study Group of post-graduate students of the Public Health Department of the London School of Hygiene and Tropical Medicine, to which I acted as tutor. The students, and the qualifications that they were working for were Dr. D.W. Boatman and Dr. S. Ogen (Diploma of Public Health), and Miss F.E. Hunt and Miss E.M. Main (Health Visitor Tutor Certificate). I am most grateful to them for their help and interest in this work.

(2) These are only one quarter of the full number that would have been associated with the 46 rejected men. This selection was made in an effectively random manner to avoid filling up the recording system of the original study with the records of fit men.

(3) This youth was placed in Grade I by the Medical Board with no defect noted. On the PULHEEMS system of medical classification he was noted as M2 - of average or above average intelligence. He scored 2 on the intelligence test - the level below which mental backwardness is suspected is 11. On his school record card his mental condition was noted as "Backward" in 1947 and 1950. He was referred to a Child Guidance Clinic in 1948, and was educated in a special class. During his school life he suffered from a speech defect. Curiously, he was never called upon to serve, as between this examination by the Board and enlistment he had a minor attack of poliomyelitis and was re-examined and rejected because of this.

suggest that there was any important number of defects being missed by the Medical Boards that would be found if they had the School Health Service records before them. On the other hand, there was a marked discrepancy between the findings of the Boards and the school doctors on men who were regarded as unfit for military service.

At this stage we were forced to begin to formulate hypotheses that could account for these discrepancies. The fully developed series of these are given and fully discussed on page 37 et seq.. At this stage only two were visualised and discussed. These were that there had been a substantial decline in the health of the young men between leaving school and medical examination preparatory to call-up, or the periodic medical inspections of the School Health Service had not been effective. Either of these hypotheses, if substantiated, would be of considerable importance, and it was therefore decided to make further enquiries.

Part II

The Main Study

The Design of the Experiment

When this experiment was designed, the existence of a large discrepancy between the findings of the Medical Boards and the school doctors had been shown in the area of two Local Authorities. Further the samples on which this information was based were small. Therefore, to confirm the existence of the observed phenomenon, and to establish if it was found in other areas, a larger study upon the same lines was needed.

There existed, as part of the other studies of National Servicemen previously referred to, a substantial number of transcripts of the records of the Medical Boards. The records were of men drawn from a wide area of the Home Counties, from North West London, and South East Lancashire, and from Glasgow and the West of Scotland. Thus, if the same discrepancies were found in the

larger sample, it would make less likely the possibility that the original sample was in some way unrepresentative. It was therefore decided, after discussion, to seek the co-operation of the Local Authorities for all the areas from which potential National Servicemen whose records were in this sample had come.

As there seemed to be no indication that many men were being accepted as fit who would not have been if the Medical Boards had had the records of the school doctors before them, this side of the "pilot" study was not developed. Only the records of men rejected for National Service on medical grounds were matched with the School Health Service findings. Thus the experiment was not a full comparison of the relative efficiencies of the two systems of examination. It was a comparison of the findings of the periodic medical inspections with the combined findings of these examinations and those of the Medical Boards. It is a test of these periodic inspections, or a measurement of the rate of increase of prevalence of defects in young men who have just left school. It gives no information about the effectiveness of the examinations of the Medical Boards.

These problems were fully discussed with the Ministry of Education, and it was with their co-operation that this study was made. The actual organisation of the data, the discussion of it, and the conclusions reached and recommendations made, are my own responsibility, and have no official sanction either of the Ministry of Education or of the Medical Research Council.

Experimental Method

The Principal School Medical Officers (P.S.M.O.'s) of the areas from which records had been derived were approached. All helped most generously. They were asked to lend me the School Health Service records of such of the men as they could still trace. The actual method employed was for the personal details of the men to be copied from the transcript of their pre-service medical examination onto a small card, which was sent to the P.S.M.O., and returned with the school

records attached to it. Then the findings of the two examinations were compared.

Because more than one pathological condition may exist in the same man at the same time, there are always two ways of looking at statistics dealing with the medical condition of groups of people. Either the number of men with conditions corresponding to certain criteria can be tabulated, or the number of the conditions or defects. As this is primarily a study of the effectiveness of two systems of examinations, or of the change in prevalence of certain defects, and there is little other information to focus information on the individual, this work has been organised as a study of defects. All the Tables, with some few exceptions where it is stated, refer to defects sufficiently severe to cause the rejection of the men who suffered from them.

In this enquiry, data that had already been collected for other purposes was merely re-arranged. As it was not collected with this particular purpose in mind, there are certain inadequacies. It would have been of great interest to have had for each defect the man's statement of the date of its beginning. This would have enabled a much clearer decision to be made between the ascription of a discrepancy either to an ineffective examination at school, or to a recent origin of the defect. The purpose of the Medical Boards is to assess the man's present fitness for National Service. While the date of the beginning of his defect is interesting, and is often recorded, it is not really essential to this decision and consequently is not uniformly noted. Further, at the time when the records of the Medical Boards were transcribed this particular comparison had not been envisaged, and so no insistence was made that this piece of information should always be set down if it was written on the primary records.

A further difficulty is that, as the study was made some three years after the majority of the men had left school the proportion whose school medical records were recovered was not high. In all about one third of the total numbers

of records of men rejected for National Service were satisfactorily matched with their corresponding school medical cards.⁽¹⁾ Many departments lack adequate storage space, and the cards are often disposed of after an interval of a few years. The recovery was particularly low in Scotland. It is not certain whether this was because the cards tend to be thrown away earlier there, or because this was the last part of Britain where the records were sought. Such a loss of two thirds of the possible data might introduce a large bias into the results of the experiment, if the loss was associated with some particular type of record. As a check on this, the percentage distribution of the different types of defect is given in Table 1. for the two series - the original group of men rejected for National Service, and the group for whom completed pairs of records became available. No major distortion in the type of illness or defect has been produced by this removal of two thirds of the possible data. The largest proportionate difference is of cases of tuberculosis where there is a deficiency in the paired records. The Scottish material is most poorly represented in the series of completed pairs of records, and the prevalence of tuberculosis in this area is much higher among these men than in England (Lee, 1955a.) Tuberculosis is not one of the conditions that has been subjected to detailed investigation in this study. Apart from this, the lost data has been spread practically evenly over the causes of rejection. This makes it less likely for there to be a distribution of the lost records in some way that would affect the validity of the findings. If, for instance, the loss was concentrated among those more severely disabled, as it might be if the cards were subjected to more frequent reference, it would be most unlikely that at the same time the

(1) Approximately 1,300 enquiries were made, and adequate school records of 450 men were obtained.

Table 1 Percentage distribution of the defects in the two series - the original one of men rejected for National Service, and the one derived from it of completed pairs of records.

<u>Type of Defect</u>	<u>Original Series</u>	<u>Series of Pairs of records</u>
Ear, Nose & Throat Condition	16.3 %	18.8 %
"Orthopaedic" Conditions	14.7 %	11.7 %
Emotional Instability	10.7 %	10.7 %
Mental Defect	8.9 %	9.9 %
Defective Vision	8.6 %	9.4 %
Asthma, etc.	6.8 %	6.1 %
Cardiac Conditions	5.0 %	5.9 %
Poor Physique	3.4 %	5.2 %
Tuberculosis	6.0 %	4.0 %
Hernia	3.7 %	4.0 %
Skin Conditions	4.3 %	3.6 %
Epilepsy	2.6 %	2.9 %
Other Conditions	8.9 %	7.8 %
	<hr/> 100.0 % <hr/>	<hr/> 100.0 % <hr/>
Numbers of defects in each series	1,493	477

loss would not be concentrated upon certain conditions which cause severe disability.

When there is some notable discrepancy between two records which apparently apply to the same man, this assumption must be further tested. In the rest of this study, where an individual is referred to, the points of correspondence of the two sets of personal data (such things as name, address, date of birth, etc.) will be given, so that the strength of the evidence for the assumption in the particular case can be gauged.

Results of the Main Study

Among the men for whom pairs of records were completed, there were 477 defects sufficiently severe to cause rejection. These are listed and classified in Table 2

Table 2 Numbers of each defect, and whether or not noted by the School Health Service. (1)

<u>Type of Defect</u>	<u>Noted</u>	<u>Not noted</u>	<u>Total</u>	<u>Percentage Noted</u>
Ear, Nose & Throat Condition	44	46	90	49 %
"Orthopaedic" Conditions	32	24	56	57 %
Emotional Instability	9	42	51	18 %
Mental Defect (2)	31	16	47	66 %
Defective Vision	37	8	45	82 %
Asthma, etc. (3)	16	13	29	55 %
Cardiac Conditions	16	12	28	57 %
Poor Physique	22	3	25	88 %
Tuberculosis	6	13	19	32 %
Hernia	3	16	19	16 %
Skin Conditions	3	14	17	18 %
Epilepsy	7	7	14	50 %
Other Conditions	12	25	37	-
Total Defects	<u>238</u>	<u>239</u>	<u>477</u>	<u>50 %</u>

Table 2 (Cont.)

Footnotes

- (1) Only defects sufficiently serious to cause rejection by themselves have been included in this Table.
- (2) Cases of a minor degree of mental retardation coupled with emotional instability have been included here, as it seemed reasonable to assume that the lack of intelligence was the primary condition.
- (3) Including asthma and eczema, severe hay fever, food allergy, etc.

Whether or not they were noted by the school doctor is also shown. Half of the defects that existed at the age of 18 or a little older were noted on the men's School Health Service record cards. This confirms the finding of the "pilot" study. The remainder of this study consists of an attempt to explain this large discrepancy by means of the data available. Because only that data which was already collected for other purposes has been used, the expositions given cannot be conclusive. This must wait for direct experiments. However, the finding that is quite unequivocal, and which deserves fuller explanation, is the simple one already given, that only about half of the defects for which men are rejected for National Service are recorded, ~~for whatever reason~~, by the School Health Service.

It is clear from Table 2 that the extent to which any condition is recorded by the earlier examination varies widely, and therefore, for any more detailed study, the conditions must be examined separately. This is done in the succeeding sections.

Three different approaches have been made to the data. By the first, the size of the observed discrepancy between the estimates of the prevalence of the condition given by the two examinations is related to probable changes in the prevalence of the condition over the interval of age in question. This

sort of reasoning is useful when there is some information about the latter point. Thus it can be used for chronic otitis media, where studies have been made of the change in prevalence with age, or with conditions such as congenital ones that have clearly been present for a long time. The second method is to compare the history of the man's defect collected by the Medical Board with the school record. Thus if a permanent condition can be related to a definite episode in the man's childhood, a note of it in the school doctors' records can be searched for with some confidence. Thirdly, the published prevalences of certain conditions as found by the School Health Service can be compared with the prevalences found by the Medical Boards, and, at the same time, with probable changes in the prevalences over the age gap between the examinations. This has been done for chronic otitis media and epilepsy.

Ear, Nose and Throat Conditions

The most common cause of rejection in this series was disease of the ear, nose and throat. The vast majority of this was chronic otitis media. The findings are given in Table 3.

Table 3 Numbers of men for whom complete pairs of records were available, with defects of the ear, nose and throat sufficiently severe to cause rejection. By kind of condition, and whether or not noted by the School Health Service.

	<u>Chronic Otitis Media</u>	<u>Other E.N.T. conditions</u>	<u>Totals</u>
Noted by School Health Service	38	6	44
Not noted by the School Health Service	<u>37</u>	9	46
Total completed pairs of records	75	<u>15</u>	<u>90</u>
Percentage noted by School Health Service	50.6 %	40.0 %	-

It is laid down that for a man to be rejected because of chronic otitis media there should be either a perforation in both ear drums, or, if the disease appears to be on one side only, evidence that it is active. I know of no reason why this standard should not be kept to, and indeed there is sufficient clinical description put down to show that it is. On the other hand, it can be accepted that if boys were found at school to have conditions in their ears that could be described in these terms, they would be classified by even the most conservative as needing at least "observation". Table 3 shows that only about half of the men rejected because of this condition had a record of it upon their school documents. Thus there seem to be only two possible explanations of the observations - either there is a large increase in the prevalence of chronic otitis media during the years 15 to 18 years of age, or the periodic medical inspections of the School Health Service is an ineffective method for the detection of this condition.

Data that is independent of this experiment confirms that this discrepancy between the findings of the School Health Service and the Medical Boards is real. In his report, the "Health of the School Child" which is published biennially, the Chief Medical Officer of the Ministry of Education gives the prevalence of otitis media in the school population, as found by these periodic medical inspections. The latest figure available, those for 1954, was 9.3 cases found per 1,000 children examined. In contrast to this, the following prevalences of chronic otitis media (using the definitions given above) were found among men examined before National Service (Lee. 1955a).

Home Counties	26 per 1,000
North West London	33 per 1,000
South East Lancashire	42 per 1,000

The Ministry of Labour and National Service's own figures, based upon much larger samples, were of similar magnitude.

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Unfortunately, the Ministry of Education figures on the prevalence of the condition among school children are difficult to interpret as they relate to a population of unknown age and sex composition. It is known that the prevalence of chronic otitis media changes greatly from one stage to another of the life of a child. But the figures given by the Ministry is not likely to be an underestimate of the prevalence when the children left school, for the evidence suggests that the prevalence declines from the earliest years of school life onwards. Figures from London (London County Council, 1956) illustrate the extent and direction of this variation in prevalence with age and sex. Thus any amalgamation of the findings among children younger than those leaving school with those relating to "leavers" will tend to raise the prevalence. Using figures relating to the average school child examined instead of figures derived solely from examinations of children leaving school will tend to diminish the observed discrepancy. Thus the discrepancy between the findings of the Medical Boards and the school doctors on chronic otitis media which was indicated by this experimental work, is confirmed.

This observed discrepancy might be due to an increase in the prevalence of the condition between 15 and 18 years of age. The figures from London already quoted (Table 4) show that there is a steady decline in the prevalence during school life. If there is indeed a reversal of this trend in the next three years, it would be a remarkable epidemiological phenomenon, and one that it is not likely would have remained uncommented upon for so long. There is some American work which also suggests that there is no increase in the prevalence of this condition during the years of adolescence. The figures from this are given in Table 5. These are based upon reported cases of illness, and not on examinations of complete populations, but there seems to be no reason why the trends should be different.

Table 4 Percentage of children discovered by the routine examinations of the School Health Service in the area of the London County Council to be needing either treatment or observation because of otitis media. 1950 & 1951. (1) (London County Council, 1955)

	ENTRANTS		7 YEARS		11 YEARS		LEAVERS	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Rates per cent								
Otitis media								
1950								
Treatment %	0.6	0.6	0.4	0.4	0.2	0.2	0.06	0.04
Observation %	0.8	0.7	0.4	0.4	0.1	0.2	0.06	0.10
Total %	1.4	1.3	0.8	0.8	0.3	0.4	0.12	0.14
1951								
Treatment %	0.6	0.6	0.4	0.3	0.2	0.3	0.20	0.08
Observation %	0.9	0.9	0.6	0.6	0.2	0.3	0.05	0.10
Total %	1.5	1.5	1.0	0.9	0.4	0.6	0.25	0.18

(1) These are the last years for which this detailed breakdown is available for this Authority.

Table 5 Annual total case rates per 1,000 population. (Collins, 1955)

<u>Age</u>	<u>Otitis media</u>	<u>Mastoid Disease</u>	<u>Age</u>	<u>Otitis media</u>	<u>Mastoid Disease</u>
Under 1	61.4	2.93	11-	9.3	0.34
1-	54.9	2.10	12-		
2-	41.8	1.39	13-		
3-	35.6		14-		
4-	34.6	2.63	15-	5.1	1.59
5-	33.2	4.05	16-		
6-	28.3	4.16	17-		
7-	21.2	1.48	18-		
8-	14.6		19-20		
9-	14.2	0.77			
10-	11.2				

Total number of cases - otitis media = 909
mastoid disease = 70

Thus, to sum up this section, evidence has been presented that far more chronic otitis media is found by the examinations before National Service than is found about three years earlier by the periodic medical inspections of the School Health Service. This discrepancy is not likely to be due to a rise in prevalence of the condition over the period, nor to differences in criteria.

"Orthopaedic" Conditions

This group of conditions of heterogeneous origin are linked by the common feature of defective function of the limbs or vertebral column. They formed the second most common cause of rejection for National Service in this series. The findings are given in Table 6. The most interesting feature of this Table is the variation in the degree of agreement between the two systems from one cause of defect to another. There is good agreement over severe defects of the feet. These defects are likely to be present, at least to some extent, since very early life. On the other hand, there is much less good agreement between the systems over the diagnosis of defects that resulted from accidents. The ease with which the two types of lesion could be diagnosed would be little different, and it seems that the differences indicate that most of the accidents took place after school leaving. Otherwise, the school doctors would have diagnosed them in the same way that they diagnosed the foot defects.

Two cases are interesting as they show that the difficulties of the Service may be administrative as well as clinical. Children have to be brought before the doctors for the examinations to be made at all, and this step raises its own problems.

2,044 Rejected because of "severe bilateral hammer toes" - all with shortened tendons and painful corns". There is no mention of this on the school medical card. There is a record of only two examinations, which took place at the ages of six and eight years. (The cards agree on name, date of birth and address.)

Table 6 Men with "Orthopaedic" Defects sufficiently severe to cause rejection.

	<u>Defects of feet, etc.</u>	<u>Sequelae of accidents</u>	<u>Other Causes</u>	<u>Total</u>
Noted by School Health Service	12	6	14	32
Not noted by School Health Service	2	8	14	24
Proportion noted by School Health Service	86 %	43 %	-	-

Emotional Instability

As is shown in Table 2, of the men in this series, there were 51 who were suffering from a substantial degree of emotional instability, and were of normal intelligence.⁽¹⁾ These 51 men can be split into two groups - those with, and those without nocturnal enuresis. The numbers of each, and whether or not their condition was noted by the School Health Service, are given in Table 7.

Table 7 Numbers of men of normal intelligence with emotional instability insufficiently severe to cause their rejection for National Service. The numbers with enuresis are given separately, and the numbers where the condition was noted by the School Health Service are given.

	<u>Nocturnal Enuresis</u>	<u>Other forms of Emotional Instability</u>	<u>Totals</u>
Noted by School Health Service	2	7	9
Not noted by School Health Service	13	29 +	42
Totals	15	36	51
Proportion noted by the School Health Service	³ 10 %	19 %	-

+ The smallest and most indefinite note has served to exclude a man from this group, thus - "difficult child", "poor scholar", etc.

(1) This classification has not been adhered to exactly - in order to discuss all the cases of nocturnal enuresis together, 2 men of low intelligence have been included.

The diagnosis of emotional disorder is more subjective than is that of chronic otitis media or orthopaedic defect. Thus it is possible that the Boards were diagnosing as defects states that really were not outside the limits of the normal. This is unlikely for two reasons. There is independent evidence for the high prevalence of emotional disorder derived from the Social Survey of Sickness (Stocks, 1949), and from the records of general practitioners (Logan, 1952). Also the discharge rate from the Army for psychiatric reasons is much higher in the early months of service than it is later on. This suggests that a proportion of men slip through the system of medical examination who are so temperamentally unstable that they are unable to settle down in the service.

Further, the inadequacy of the facilities of the Medical Boards for psychiatric diagnosis means that they tend to rely greatly on outside help - either from the man's own doctor or from a consultant, and to be most conservative in the rejections that they make without calling one or other of these. Thus of the 26 men in this series who were rejected because of emotional instability without emuresis, and of whom the school doctors made no comments, only 8 were rejected without consultation by the Board of either the man's own doctor, or a psychiatrist. Of these 8, 4 suffered from some other defect which would have rendered their rejection inevitable, so there was little point in the Board's going on to establish the psychiatric diagnosis.

The differences in the findings of the Boards and the school doctors might be accounted for by a real increase in the prevalence of psychological disorder between the age of leaving school and call-up. Certainly, the mental hospital admission rate increases sharply during this period. Table 8. On the other hand, there is evidence for a high prevalence of serious maladjustment among school children. (Committee on Maladjusted Children, 1955a). There may well

be great differences in criteria here, and it would not be wise to go beyond suggesting that there is good evidence that the diagnoses of emotional disorders made by the Boards are not likely to be a great overestimate of the amount of mental ill health in the group. Obviously the periodic medical inspection of the School Health Service is not a good instrument for the diagnosis of these conditions (Committee on Maladjusted Children, 1955b). Indeed, it is hardly fair to expect that these conditions would be extensively sought or noted by school doctors working in the period when these examinations were made, for very few of the cards used before the standard form LOM of the Ministry began to come into use in 1947 had a space for the recording of such conditions. Certainly, the figures on the prevalence of maladjustment among school children suggest that even with the reduction in the incidence of physical illness, there is still ample scope for medical work among this group of the population.

Table 8 Mental Hospital First Admission Rates per 100,000. 1951. By ages. Males. (Registrar General, 1955a)

Age Groups	0-	10-	16-	20-	25-	35-	45-55
Rates	1	12	64	99	99	82	89

The findings for nocturnal enuresis are puzzling, for there can be no question of a substantial incidence of new cases in the years after leaving school. The condition is a pathological continuation of a physiological condition beyond the normal limits of age. In fact the prevalence steadily decreases throughout childhood (Bransby 1953).⁽¹⁾ If it is accepted that these 15 men were enuretic, and had been since earliest childhood, the fact that the

(1) There may be some cases of the simulation of this condition, including the family doctor in the deception, but I do not think that these will be common enough to affect the discussion. Unless the man is obviously psychologically disturbed, the Boards do check a history of enuresis by reference to the family doctor. The prevalence reported by different Boards is remarkably similar.

condition was recorded by the school doctors for only two raises considerable problems. The situation appears to be similar to that found with the diagnosis of epilepsy, and the problems are discussed together on page 40.

Rejections due to Low Intelligence

Men who are mentally deficient are not required even to register for National Service, and so do not appear in this study. However, there is a substantial range of intelligence which is above that which necessitates the formal procedures of ascertainment, etc., and yet which is below that which the services can usefully employ. Such men are therefore rejected by the Medical Boards. Besides its direct effects, poor intelligence imposes difficulties in adjustment to social life, and especially to changing situations. Many men, who might be capable of doing many of the simpler military tasks, are not considered to have sufficient emotional stability to make it worthwhile recruiting them. Thus some men are rejected because their intelligence is so low that they clearly would not be likely to serve usefully, and some are rejected because although they might be able to manage intellectually, their adjustment is not considered good enough. The latter group of men have been considered in this section, and not in the preceding one, because it seems more logical to regard their low intelligence as the primary defect. The numbers in the different groups, and whether or not there was a note of the condition on the School Health Service records, are given in Table 9. The classification described is one designed for administrative purposes, and is much simpler than reality. However, it does have some meaning.

The doctors of the Medical Boards were generally working in ignorance of the findings of the school doctors, yet these two subdivisions of the men that they rejected because of low intelligence show different proportions noted by the school doctors. The explanation, I think, is that the men rejected without

Table 9 Numbers of men rejected because of low intelligence, with whether or not the condition was noted by the School Health Service.

	<u>Low intelligence & normal stability</u>	<u>Low intelligence & unstable</u>	<u>Total</u>
Noted by School Health Service	13	18	31
Not noted by School Health Service	-	16	16
Totals	<u>13</u>	<u>34</u>	<u>47</u>

comment on their emotional stability were on the average of much lower intelligence than were those who were only rejected when their stability was uncertain as well. Hence, with men of really low intelligence (but still not sufficiently retarded for legal procedures to be invoked) there is good agreement between the Boards and the school doctors. With men of greater abilities, the agreement is not so good, and it seems as if school doctors are often unaware of these cases.

If this lack of information about men with apparently low intelligence were confirmed, it would be important. This is for two reasons. The doctor has a contribution to make to the understanding of the dull child, and in particular to helping him with his emotional adjustment. Further, until a child has had a comprehensive medical examination it cannot be said that its apparent dullness is not due to some remedial medical condition. The problem of distinguishing those of truly low intelligence from those with a defect of hearing is an old and well recognised one, but it cannot be considered solved unless every backward child has had the possibility of a medical cause for its trouble rigorously excluded.

Unfortunately it is not possible to carry the discussion further in the particular section as the standards of mental ability ^{used by} of the Medical Boards

varied greatly from one to another. I do not think that any men are rejected under this heading who would be of such high intelligence as to present no educational problem, but the data is inadequate for further discussion.

Rejections due to Defective Vision

45 men in this series had defects of vision sufficiently severe to cause them to be rejected for National Service. The blind do not come into this discussion at all, for they are specifically excluded from registration for National Service by statute. The criteria for rejection for service are monocular vision, or vision so bad that more than seven dioptries of correction are needed. (This is to avoid recruiting men with a special liability to detachment of the retina.)

It is well known that the vision of myopes tends to deteriorate during their adolescence. Hence, it is not usually possible to decide from the information available whether or not the vision has been accurately measured at school. Of the 45 men, 37 had some defect of vision noted during their school life, but not necessarily of the same magnitude that was found at 18. 7 men had defects at the pre-service examination but good sight at school, but all of these had suffered acute episodes that could well have been after school leaving. Thus 5 had lost the sight of an eye by trauma, and 2 had had choroditis. In one case only was there real evidence that the measurement of vision by the School Health Service had been ineffective.

0,766 At the age of 18 years and 2 months a consultant ophthalmologist found vision of less than 6/60 in his right eye. The eye was amblyopic and anopic, with 5 dioptries of long sight and 2 of astigmatism. The condition was uncorrectable, and, in the opinion of the consultant, had been present for many years. The man's vision was recorded as 6/6 in both eyes in 1943, 1947 and 1949. The pre-service examination was in 1953. (The 2 sets of documents agree as to name, date of birth and name of school. The addresses are different.)

Rejections because of Allergic Disorders

29 men were rejected in this series because of allergic disorders, and 16 of them had their condition noted by the School Health Service. Of the 13 not noted, 12 were rejected because of bronchial asthma.

Of the 12 men rejected because of bronchial asthma who did not have their condition noted by the school doctor, 7 had their history confirmed by their own doctor, and a further 1 had physical signs noted at the time of the examination. Thus in two thirds of the cases the existence of the condition is confirmed by more than the bare history. Of the remaining 5, 3 had other conditions that would have caused rejection in any case, and so this particular history was not followed up. Thus, if only confirmed cases of bronchial asthma are considered, the School Health Service had notes of 16 out of a total of 24. If the (so far as this study goes) unconfirmed cases are added, this figure becomes 16 out of 28.

If the prevalence of bronchial asthma increased during adolescence, these observations would be expected, but this is not so. Again, American figures given in Table 10 show the tendency.

Table 10 Annual age specific case rates for asthma per 1,000 population.
(Collins et al., 1955b)

Age	Under 5	5 - 9	10 - 14	15 - 19	20 - 24
Asthma	3.99	6.11	5.44	4.41	3.23

Thus it seems probable that these men did ~~not~~ have the condition whilst at school and it was not picked up by the periodic medical inspections. 2 case histories appear to exemplify this:-

5,294 The Medical Board found that he had "Asthma since childhood with attacks about once a month which lead to absence from work. Desensitisation has been tried without success." Apparently no confirmation of this was sought from his family doctor. There was no record of the condition on the School Health Service record card. He received four periodic medical inspections. (The documents agreed in name, date of birth and address.)

24
7,217 Marked asthmatic wheezing was found in both lungs, and the man's family doctor certified that he suffered from chronic asthma. He underwent periodic medical inspections at the ages of 6, 10 and 14. There was no mention of asthma on his School Health Record card. (The documents agreed on name and date of birth. The addresses differed, but were within the same city.)

The evidence presented here seems to suggest that asthma is not reliably discovered by the periodic medical inspections of the School Health Service. It may be that the history of this condition is not always brought out for much the same reasons that affect the diagnosis emuresis and epilepsy, and this is discussed further on page 40. But bronchial asthma is likely to cause an excess of absence among sufferers from it, and it is surprising that more of these cases have not come to been recorded because of special examinations made at the instance of the school nurse or teacher.

Rejections due to Cardiac Defects

From this series, 28 men were rejected because of cardiac defects. Of these, 16 had the defect noted by the School Health Service, and 12 did not. It might be thought that this considerable difference might be due to the Board's rejecting men because of unimportant systolic murmurs. But of these 12 men, 10 were seen by consultants. It is thus very unlikely that they did not have real lesions.

It is also possible that the defects arose during the gap between school leaving and the pre-service examination. This distribution of these cases between those of congenital and those of rheumatic origin is given in Table 10. It seems certain that at least the ⁴four congenital defects that were not noted out of the 7 actually present were there to be diagnosed all the time. The details of these are given below.⁽¹⁾

(1) It is theoretically possible for a previously undiagnoseable congenital lesion to begin to produce signs, but only after an attack of bacterial endocarditis. No history of anything resembling this was given for any of these cases.

- 0,184 Note by Consultant "Heart enlarged to 6th. space: systolic and diastolic bruit at base: aortic sounds almost absent. E.C.G. right axis shift. B.P. 108/72. Congenital heart."
This man was seen by the school doctor at 4 periodic inspections, and at the final one was passed fit for all kinds of work. There was no note of any cardiac defect. (The cards agree as to name, date of birth, and give addresses in the same small village.)
- 0.719 "Soft systolic bruit at apex and accentuated second sound." (Board)
"Systolic murmur present --- may indicate a minor congenital abnormality." (Consultant) This boy was seen at 4 periodic inspections of the School Health Service. (The cards agree on name, date of birth and address.)
- 0,790 "Congenital pulmonary stenosis" (Cardiologist) This boy was seen at 4 periodic inspections of the School Health Service. (The cards agree on name, date of birth and address.)
- 2,520 "I think that the basal systolic bruit is almost certainly congenital, but it is possibly due to chest deformity." (Consultant) On the documents available there is a record of only one periodic inspection, but this was at the age of 14. (The cards agree on name, date of birth and address.)

Some of these defects are probably of little present importance, and there is no evidence that earlier diagnosis would have made a great difference to these men. All that is suggested is that the defects were there, and should have been recorded. The school medical records are confidential documents, not available to lay people. If the murmurs were heard, they should have been noted, if only to establish a base line for the next examination. To dismiss even a systolic murmur in a child as so totally lacking in significance as not even to make a note of its existence, after only a moment's examination of the heart, seems an unlikely procedure for a competent doctor. It seems far more probably that under the conditions of the examination, the murmurs were not heard.

Table 10 Details of men rejected because of Cardiac Defects.

<u>Type of Lesion</u>	<u>Congenital</u>	<u>Rheumatic</u>	<u>Non-valvular</u>	<u>Total</u>
Not noted by School Health Service	4	7	1	12
Noted by School Health Service	<u>3</u>	<u>13</u>	<u>-</u>	<u>16</u>
Totals	<u>7</u>	<u>20</u>	<u>1</u>	<u>28</u>

20 of the men rejected with organic cardiac defects had valvular defects that were not specified as congenital. These have been accepted as being due to rheumatic fever. Of these 20, 13 had their defects noted by the School Health Service. The prevalence of rheumatic heart lesions increases with age, due to repeated attacks of rheumatic fever or to silent progress of the fibrosis of valves. However, if it is accepted that the examinations of the Boards and of the School Health Service are of equal effectiveness in the diagnosis of these lesions, it follows that the prevalence of diagnosable rheumatic heart disease increases by 50 per cent between the ages of 14 and 18. This does not seem to be very likely.

In one case, which has been included with those that the school doctors did note, the condition was definitely missed by a routine examination, and only came to the notice of the School Health Service through an outside doctor.

2,393 As a pre-school child was in hospital for one year with rheumatism. "He was examined at the routine Medical Inspection in March 1949 (i.e. aged 13 years and 5 months), and there is nothing on his card to indicate that the boy was not a normal boy." In November 1949 a certificate was sent from his own doctor that he suffered from "severe morbus cordis". He was then examined by the consultant to the School Health Service. Unfortunately no copy of his report is available, but, as the boy was forbidden P.T. and games thereafter, it seems certain that he found a similar clinical picture to the one the Board did at the age of 18. This ^{was} an apical diastolic bruit and a Corrigan's pulse - indicating severe aortic valvular disease. I do not think that there is any doubt that this defect was present when he was examined in March 1949, and was missed.

Thus there seems to be a high probability that a substantial proportion of organic the/cardiac defects present in children are not diagnosed by the periodic inspections of the School Health Service. This is particularly important, not for the children's sake directly (although with the current developments in cardiac surgery the diagnosis of these defects is taking on a new importance), but because the ability of the doctors of the service to diagnose at routine examinations symptomless cardiac lesions has been held to be an important

reason for the continuation of these examinations. This argument derives its validity from the assumption that the examinations are a reliable means of making these diagnoses. This has never been checked, and this evidence suggests that it may not be true.

Rejections because of Poor Physique

From any large sample of potential recruits, a group will be found who have been rejected because their physique is too poor for them to make useful soldiers. They may be either too fat or too thin. Usually no attempt is made to go deeper into the matter than this. Often the comment is made about men who at the same time suffer from such conditions as severe asthma or pulmonary tuberculosis. In these and similar cases, it does not seem possible without a special enquiry to separate their physique from their disease. In this study they have been excluded from the group. Of the remainder, 25 men were rejected only because of their poor physical potentialities. None of these had another disease mentioned that was likely to produce general effects of importance. All but three of them had some note on their school medical cards - they were either placed in nutritional category "C" or were remarked to be "a small lad" or some such phrase was used.

Rejections because of Hernia

19 men suffered from hernia - which at this time was a cause of rejection. 3 of these were recorded upon the school medical cards. These defects were all symptomless, and no estimate can be made of the time when they first became noticeable.

7 men in this series were noted as not having both testes in the scrotum - i.e. with one or both still in the abdomen, or nonexistent, or lodged somewhere in the inguinal canal. The absence of one or both testes from the scrotum was not in itself a cause of rejection, but in practice it often led to this, either

because the testis was fixed in the canal and exposed to trauma, or the non-descent of both of them was part of a general delayed development of sexual characters which was thought to be associated with a reduced capacity for heavy work. Of these 7 ment, only 2 had the condition noted by the School Health Service.

Rejections because of Tuberculosis

The records of this condition behave as would be expected from a knowledge of its changes in prevalence and type with age. 9 men were rejected because of types of the disease other than the pulmonary disease of adults. 4 of these had bone and joint lesions, and 2 had suffered from complicated primary infections. All of these were recorded on the school documents. Two had pleural effusions and one had cervical glands. None of these were noted, but all might have developed after school leaving.

10
The men were rejected because of the adult type of pulmonary tuberculosis.⁽¹⁾
For none of these was there any record of the disease on their school documents.
This is as would be expected, except in one case -

O,741 The Chest Clinic (to whom the man had been referred after an abnormal M.M.R. finding) stated that "The family medical history is bad - one brother and one sister have died of tuberculosis. X-ray showed opacities in both lungs. There is no sign of active tuberculosis, but he should be examined and x-rayed in three months." It was confirmed that there had been pulmonary tuberculosis in this man's family for much longer than three years - the interval since he left school. (The cards agree in name, date of birth and address.)

(1) The services are conservative in their standards for acceptance, and minor lesions may lead to rejection.

Men with Skin Conditions sufficiently severe to cause Rejection⁽¹⁾

In this series, 17 men had skin conditions that were sufficiently severe to cause rejection. For 3 of these the existence of the condition was noted on the school medical card, and for the rest it was not so noted. Of the 17, 8 suffered from severe acne alone, while another 2 had this as well as another skin condition. Although acne is a self-limiting disease, the sufferers are likely to make quite large demands on the medical services, and are limited in their employment in the Armed Forces. Of the other men rejected with skin conditions, 4 suffered from psoriasis, and the rest from chronic eczema.

So far as I am aware, there is no information about the changes in prevalence of skin conditions during adolescence available. Thus no estimate can be made of the proportion of these cases where the disease had reached noticeable proportions before school leaving. For one man there is sufficient evidence to suggest that this was probably so.

0,698 The Board's note reads "Psoriasis of six years duration. Widespread and intractable." There is no note of this upon his school medical card, but unfortunately he received his last medical examination at the age of 11 years and 6 months. The Board's examination took place at the age of 18. (The cards agree as to name, date of birth, but the address is different.)

Rejections due to Epilepsy

In this series, there were 14 men rejected because of epilepsy. Of these 7 had notes of the condition on their school health service records. Of the 7 not diagnosed, there was evidence that 4 arose after the boy had left school. About one there was not enough information to form any opinion, but for the remaining 2 there does seem reasonable evidence that the condition was present during school life.

(1) Excluding eczema associated with asthma. These cases have been included with the other asthmatics.

2,164 The Board's note read "Idiopathic epilepsy since infancy - arrangements have been made for him to have treatment after seeing consultant." The consultation was made to establish the diagnosis, before rejecting the man for National Service. There was no note of the condition on the man's school health card. Clearly the epilepsy cannot have worried him very much, for it still not to be under treatment. Also we only have his statement that the condition had lasted since infancy. On the other hand, there would be little point in fabricating this part of the story. (The two sets of cards agree as to name, date of birth and address.)

1,052 A note from the man's own doctor stated that he had had "epileptiform attacks since the age of 5. He had been taking pheno-barbitone twice daily for many years. The last attack was 2 weeks ago." There was no note of this condition on the school medical card, and he had been passed by the School Health Service as fit for all employments. (The two sets of cards agree on name, date of birth and address.)

It is not likely that a substantial proportion of the men rejected for National Service because of epilepsy do not in fact have this condition. Without skilled guidance fabrication is not easy, and the Board's are well aware of the possibilities. There is good agreement between widely different systems as to the prevalence of the condition. Thus the Ministry of Labour and National Service give a figure of 5.43 per 1,000 (1954), while 4.7 per 1,000 were found in Holland (Ledeboer, 1949), and 5.0 per 1,000 in Switzerland (ibid.).

These figures, with their considerable degree of mutual agreement, are in complete contrast with those derived from the School Health Service. Henderson (1953) found from a very large sample of children scattered in districts all over England that 1.2 per 1,000 had the condition, while Keddle (1954), working in Dundee, found 1.77 per 1,000. Thus, as with chronic otitis media, a discrepancy between the records in this comparison has been confirmed by reference to the results of much larger studies. Unless there is a sharp rise in the incidence of the condition between the ages of 15 and 18, these figures seem to indicate that many cases of epilepsy are unknown to school doctors. This point is discussed further on page 40 .

Men rejected because of Other Conditions

10 men were rejected because of chronic chest conditions, other than tuberculosis or asthma. 3 of these had relevant notes on their School Health Service records. 9 men were rejected because of conditions of the digestive system other than hernia. None of these had relevant notes. A further 18 were rejected because of miscellaneous defects. 9 of these had the condition noted on their school medical cards. The conditions included diabetes mellitus, thyrotoxicosis, and chronic nephritis. There were not enough cases of any of the conditions mentioned in this section, or enough clinical detail about them, for it to be possible to say how many were present when the boys were examined at school.

Estimation of the Proportion of Boys who were examined by the School Health Service before leaving school

On several occasions in the course of this study, the non-diagnosis of a condition has been related to the apparent lack of any examination by the School Health Service towards the end of the boy's school career. This finding, if it is of numerical importance, splits the problem of the efficiency of the routine examinations into ^{two} 2 parts. There is the clinical problem of the efficiency of the actual examination, and there is the administrative problem of getting all the children examined. The whole point of these examinations is that they discover defects that could not be found by other means. The end result, from the child's point of view, is the same, whether its defect is not noticed by the doctor, or the examination was never made. Thus the completeness of the examination of the school population is exactly as important as the efficiency of the examination when it is made.

The Regulations governing the School Health Service at the time when these men were under its care (Ministry of Education, 1945) state that "Every pupil

attending a maintained Secondary School shall be inspected during the last year of his attendance at such a school." The current Regulations are rather different. There has been no suggestion that during the relevant period the School Health Service was unable to conform to these regulations.

Hence, the finding that a proportion of school boys had apparently not been seen by the school doctors during their latter years at school was unexpected. In 1947 the school leaving age was raised from 14 to 15 years. In order to avoid the administrative disturbance produced by this step, the following analysis has been limited to those boys who were examined by the Boards at the age of 18 or younger during the period mid-1953 to mid-1954. They should thus have been leaving school between mid-1950 and mid-1951, with a few later than this, and should have been examined not later than 1949. The results for this series are given in Table 11.

Table 11 Age of last recorded examination by the School Health Service.
Boys examined at age 18 or less in 1953-54.

Age	5-6	7-8	9-10	11-12	13	14 & over	Total
Numbers	3	17	10	19	20	301	370
Percentage Distribution	0.8 %	4.6 %	2.7 %	5.1 %	5.4 %	81.4 %	100.0 %
	13.2 %						

Thus the administration of the service at this time was such that, in spite of the categorical regulations, 13 per cent of the boys were not examined within two years of the close of their school careers. The finding is not restricted to one area. Table 12.

Table 12 Age at last recorded examination by the School Health Service of boys called up at age 18 or under in 1953-4. By area.

Age	12 & under	13	14 & over	Total
Home Counties	26 (10.7 %)	7 (2.9 %)	210 (86.4 %)	243 (100.0 %)
North West				
London	11 (25.6 %)	2 (4.7 %)	30 (69.8 %)	43 (100.0 %)
South East				
Lancashire	11 (15.5 %)	6 (8.5 %)	54 (76.1 %)	71 (100.0 %)
Glasgow & West				
Scotland	1 (7.7%)	5 (38.5 %)	7 (53.9 %)	13 (100.0 %)
	<u>49</u>	<u>20</u>	<u>301</u>	<u>370</u>

It could be suggested either than cards are temporarily mislaid rather often, and so new ones are made out - thus giving incomplete records. If this is so, it is a dangerous practice, as reliance may be placed upon such an incomplete record. I do not think that this can be very common. It is also possible that examinations are often made without the child's records being before the doctor. As school doctors are responsible for so many children (or spend only part of their time on this work) it would be very difficult for them to retain details of the children in their head's, and I do not think that they would tolerate having to make perhaps 10 per cent of their examinations without the records.

Finally, it might be postulated that the boys known to be fit were excluded from the final routine examination, in order to leave time for the fuller examination of those known to be unfit. In fact, all of this analysis has been made upon men who were unfit by the age of 18, so that a very large proportion of them will have been unfit even at the age of leaving school. Further, the following cases suggest that such selection was not practised.

- 5,269 This man was noted by the school doctor to have asthma, at examinations made at the ages of 9 and 10. He was rejected for National Service at the age of 18, also because of asthma. He was not examined during his last year at school - the Youth Employment Service School Leaving Medical Report form being still attached to the documents, and marked "absent".
- 0,020 This man was rejected at the age of 18 because of a verified history of admission to a mental hospital. He was a foster child, and was last seen by the School doctor at the age of 10.
- 0,153 At the age of 8 was noted as being a haemophiliac. He was not seen again by the school doctor. He was rejected because of the same condition, having in the interval required transfusion twice.

Part III

Further Studies on those Rejected by the Royal Air Force

As has been mentioned, these studies have been made upon material already collected for other purposes. This means that none of the data is precisely adapted for the questions that it is being used to answer. However, it has been possible to make further studies which avoided to a large extent some of the disadvantages of the main experiment. The Royal Air Force recruits boys between the ages of 15 and 17 so that they can receive a long course of specialised training to fit them for technical employment. There are ^{two} grades of this - boy entry, and aircraft apprenticeship. A sample of the medical records of boys rejected from these schemes was obtained through the courtesy of the Air Ministry, and again matched with the corresponding records of the school health service.

These examinations were much nearer the latest ones of the school health service, so that there would be less opportunity for the boy to develop new defects. Further, all the boys in this group had wanted to get into the Royal Air Force. There is probably a contrast here between these boys and the average

young man medically examined before National Service. There should be no special tendency among these boys to make the most of trivial defects, or to bring forward histories of such things as bed wetting or fits, as may happen with potential conscripts. Thus this examination is again much more comparable with those of the school doctors.

As a further point, it was suggested that some of the findings of the main study might be due to incomplete information being sent to me by P.S.M.O.'s - that there might be clinic records, etc. which described conditions that were not mentioned on the main school medical card. This would, of course, be regrettable if common, but it could explain the findings. Because of this, in the letter which was sent asking for the records of this new sample of boys, it was stressed that complete records were needed.

Finally, because of the long gap between the date of school leaving and the request for the records in the main study, there was a poor recovery of school documents. Only about one third of the possible records were obtained. In this new enquiry it seems at present (with not all the records in) that a much higher proportion will be found. In fact, reasons were put forward why this loss of data should not make a great deal of difference to the main study (page 8) but it will be possible to check this.

These boys are different from the unselected group of men examined before National Service in that they are all volunteers for the Royal Air Force. Thus the distribution of defects is different, none of the totally disabling ones are found, and there is a preponderance of minor ones that cause little trouble to the boy but which are not regarded favourably by the services. The defects split into three equal parts - defects of vision; defects of the ears; and other defects.

Although the study is not complete yet, sufficient material has come in for tentative conclusions to be made. The eye cases had usually quite different visual acuities quoted for them to those recorded on the school documents, but none of them were regarded by the school doctors as having normal sight. This may be an expression of the fundamental difficulty of measuring visual acuity, or it may only indicate the rapid changes in this in myopes of this age. There was the same lack of notes by school doctors of chronic otitis media as was found in the main study. Apart from the following case, there have not yet been sufficient examples of any one type of defect in the other conditions for any comment to be made.

O,260 Rejected because of loud systolic murmur - coarctation of aorta. He was subjected to 4 periodic medical inspections by the School Health Service, without comment about his circulatory system. (The cards agree on name, school and year of birth. The personal particulars taken were slightly different in this series.)

Part IV

Discussion of the Results of the Experiments

The value of conclusions drawn from samples depends on ^{two} things - the size and number of the samples, and how well they represent the population from which they were drawn. These samples, upon which this study is based, must be looked at from both these points of view, in order to assess the validity of conclusions drawn from them. The numbers of each separate condition are rather small, and estimates of the size of the discrepancy between the two systems of examination will be correspondingly inaccurate. But they will not be so inaccurate that it can readily be suggested that the discrepancy is due solely to sampling error.⁽¹⁾

(1) Thus, taking the results of one sample only, 16 cardiac defects noted out of 28 gives a proportion noted of 57 per cent, with a standard error of 9.5 percent, and 2 enuretics noted out of 15 gives a proportion noted of 13 per cent, with a standard error of 9.4 per cent. Neither of these samples are thus likely to have been drawn from populations where there was no important discrepancy.

Further, two of the discrepancies - those for otitis media and epilepsy - have been confirmed by independent data based upon much larger samples.

The other type of error, that the samples do not represent the population from which they were drawn, seems unlikely to be a full explanation of the phenomena. Two samples - one of 450 men's records and one of about 200 - that were drawn by quite independent methods showed very similar pictures, and again ^{these} of the discrepancies have been confirmed by outside data. Even the sample upon which the main study was based, with the admitted loss of a large part of the possible data, showed a closely similar distribution of kinds of defect to that found in the original population from which it was taken.

There are 4 types of hypothesis that can account for these discrepancies, if they are accepted as real. These are as follows:-

- (1) The doctors of the Medical Boards frequently diagnose as defects conditions that are within the limits of normal.
- (2) There is an abrupt and major deterioration in the health of young men after their leaving school.
- (3) Defects discovered by the school doctors are frequently not noted on the children's record cards.
- (4) The doctors of the School Health Service are unaware of many of the defects among the children under their care, in spite of the system of periodic medical inspections.

Any of these possibilities are sufficiently serious to call for an investigation by the Department concerned, and it does seem that the explanation of the observations must lie between them. The hypotheses are not, of course, mutually exclusive.

It is difficult to believe that the first hypothesis - that the Boards often rejected because of unreal defects - is important. It is highly unlikely that for about every one genuine case of chronic otitis media, asthma, or heart disease, another one that is either spurious or grossly exaggerated is

described in detail by the Boards. This argument might be applied with greater show of plausibility to the rejections on psychiatric grounds, but many authors (Logan & Goldberg, 1953; Committee on Maladjusted Children, 1955a) have shown how high is the prevalence of these disorders among young people.

It is a commonplace of medicine that clinical findings sometimes cannot reliably be repeated - the variation in the interpretation of radiographs is an example. The topic has been discussed further by Webb (1955a). However, differences in the interpretation of the same phenomena are not likely to be the explanation of these discrepancies. Where "observer error" has been found to be important, the two observers have been coming to the same kind of decision - i.e. that a radiograph is just within or just outside the limits of normal. Here, on the other hand, one group of observers have been saying that their defects are so severe as to preclude a man from military service, while the other group have been saying in effect that they are so trivial that they need not even be noted. Thus simple observer error does not seem to be a likely explanation of the findings.

The second hypothesis is that the prevalence of defects does in fact rise sufficiently between the last examination of the School Health Service and the pre-service examinations to account for the observations. Over this age gap the prevalence of tuberculosis (Registrar General, 1954^{5b}), and mental illness as recorded by hospital admissions (Registrar General, 1955) rise as greatly. But the evidence is the other way for such conditions as chronic otitis media and bronchial asthma. The sufferers from enuresis are likely to have had their condition from childhood. This will also be true of those with congenital lesions of the heart.

The third possibility - that defects are discovered but not recorded, seems unlikely. The number of children that a school doctor is responsible for would

rule out the carrying of the details of more than a small proportion in ~~his~~ head. Further, in most areas, it is likely that a child will be seen by another doctor at subsequent periodic inspections. It has been put forward that information was frequently noted on defect cards, etc., and not put on the main school medical record card. To get over this difficulty the importance of the completeness of the records sent was stressed in the request for help with the experiment using the findings on R.A.F. boys. As far as can be seen, this made no difference to the findings.

If it is believed that none of the 3 previous hypotheses are adequate to account for the observations, there remains the fourth - that the periodic medical inspections of the School Health Service, as performed upon these boys, were not an effective method for the diagnosis of defects. There is a good deal of positive evidence for the acceptance of this hypothesis, as well as the negative provided by the exclusion of possible alternative explanations of the observations. It cannot be discarded until better experimental data is produced.

The gap between these findings and their implications and present informed opinion is illustrated by the following quotation:- "On the whole these morbidity statistics (i.e. those of the School Health Service) contain probably no greater measure of error than may be expected to occur in mortality figures based upon death certificates." (Brockington, 1954) Even leaving out of account ^{the fact} that mortality data is present in such a way as to bring out the full meaning behind it, whereas the data from the School Health Service is not (page 14), this statement implies a confidence in the validity of these inspections as detectors of disease which stands in remarkable contrast to the findings of this study.

It has been suggested upon several occasions that these comparisons are not really appropriate - either because the conditions of the two examinations are

so different, or because the discovery of the kind of defects that seem to have been missed is not the purpose of the periodic medical inspections of the School Health Service. These are rather different points, and will be discussed separately.

It is argued that because of the probability that many young men with the prospect before them would rather not perform their period of National Service, therefore histories of such things as epilepsy or enureris are more often brought out than they are at the periodic medical inspections. Thus the deficiency of cases of these conditions, and possibly of asthma as well, in the School Health Service records is explained. It should be made clear that this theory does not suggest widespread deception of Medical Boards, but simply that the defects did exist all the time, but were not brought to the notice of the school doctors. Epilepsy and nocturnal enureris are conditions that cause shame to many sufferers from them. But they are conditions which can be treated, and which it is greatly to the benefit of the sufferer if they are treated. I agree that this reluctance to volunteer histories is the probable explanation of the observed deficiencies of these conditions, but I do not believe that this kind of explanation of the findings can be accepted without a profound re-examination of the present system. The classical situation of the medical man is that a patient in distress - whether because of a broken limb or a ritual impurity - comes to him to seek help and comfort. All systems of routine examination are carried out in a new situation, where the subject (or patient) does not feel himself to be particularly in need. If there is some strong motive for the subject to bring forward his full history, he will do so as thoroughly as he would if he was actually suffering from the condition at the time, and had sought out the doctor himself. This is the position of these pre-service examinations of conscripts. But if there is no such strong motive, and there is even the

possibility of unpleasant consequences resulting from the disclosure, and when the subject is ignorant of the probable good results of medical treatment, then it is not reasonable to expect that the histories of these conditions will always be brought forward. This is probably what happens at the periodic school medical inspections. No special efforts are made to persuade these parents of children with occasional fits, or who are bed wetters to tell the school doctors of the troubles. The results are as could readily have been predicted. The importance and commonness of previously undiagnosed epilepsy has recently been stressed, and the effects upon a youth and his family of enuresis persisting to the age of 18 are obvious. The situation is admittedly difficult, but it does present a challenge. Further, it is a challenge which it is the responsibility of the School Health Service to meet. Even on the basis of present knowledge much wider and more frequent discussion of the subjects could be stimulated, and experiments made in developing public knowledge of the conditions.

A variation of this point that the comparison made is inappropriate for measuring the success of the periodic medical inspections is the suggestion that the resources in time, etc. of the Medical Boards are so much greater that clearly they will find more defects. If these medical inspections are accepted as being too short and performed under such conditions that they cannot be relied upon to discover most of the cases of congenital heart disease, or even of otitis media, it must be asked "What is the point of doing them at all?". "The obvious defects will be found by the teachers and nurses soon enough, so why bring in the doctors if they are employed in such a way that they cannot make their special contribution, and find the defects that are both important and not discoverable by other means?"

The other point of view mentioned above is that the periodic medical inspections of the School Health Service are designed to discover defects that would

impair the child's ability to profit from the education provided for it. Thus, if a defect did not do this, there was no particular urgency for the School Health Service to discover it. This was certainly the original limited objective of the service. (Board of Education, 1910) This position focuses attention upon the common minor defects of childhood, for there are few major defects which cannot be discovered without a doctor's examination, but at the same time reduce the child's ability to profit from its lessons. Minor defects that fit these criteria are, of course, common enough, Chronic otitis media is one, and minor degrees of mental defect is another. Both of these require a medical examination, perhaps coupled with those of other workers, for their full diagnosis, and the doctor has an essential part to play in the management of the child with either. Yet it is quite clear that neither of these defects are fully discovered by the present system of periodic medical inspections.

The series of experiments described in this essay are not yet complete, and no final conclusions can be reached. But it does seem that the system of routine inspections of the School Health Service is ready for a statistical examination of what it does accomplish, and might accomplish in the future. Perhaps the most interesting point that has come out of these studies so far is that these experiments are apparently the first attempt in this country to actually measure the effectiveness of this very large system of socio-medical care.

References

- Board of Education (1910) Report, 1908. London. H.M.S.O. Page 30
- Bransby, E.R. (1953) Bed-wetting among children. Results of a pilot survey in York. Unpublished.
- Brockington, C.F. (1954) The Health of the Community. London. Page 177.
- Clements, E.M.B. (1953) Brit. Med. J. 2, 8987.
- Clements, E.M.B., & Pickett, K.G. (1952) Brit. J. Soc. Med. 6, 245.
- Collins, S.D., Trantham, K.S. & Lehmann, J.L. (1955a) Sickness Experience in Selected Areas of the United States. Public Health Monograph No. 25. U.S. Government Printing Office. Washington, D.C. Page 19.
- Collins, S.D., Trantham, K.S. & Lehmann, J.L. (1955b) The same. Page 10.
- Committee on Maladjusted Children. (1955a) Report. London. H.M.S.O. Page 168
- Committee on Maladjusted Children. (1955b) The same. Page 135.
- Henderson, P. (1953) Brit. J. Soc. Med. 7, 9.
- Keddie, J.A.G. (1955) Health Bulletin, Department of Health for Scotland. 13, -
- Ledeboer, B.C. (1949) Folia Psychiatrica, Neurol, Neurosurg, 1, 3.
- Lee, J.A.H. (1955a) Public Health, 68, 102.
- Lee, J.A.H. (1955b) Proc. Roy. Soc. Med. 48, 653.
- Lee, J.A.H. (1955c) M.D. Thesis University of Edinburgh, Unpublished.
- Logan, R.F.L. & Goldberg, E.M. (1953) Brit. J. Sociol. 4, 323.
- Logan, W.P.D. (1952) "General Practitioner Records". Studies in Medical and Population Subjects. No. 7. General Register Office. (Great Britain) London. H.M.S.O. Page 63.
- London County Council. (1956) Unpublished personal communication.

Martin, W.J. (1949)	The Physique of Young Adult Males. Medical Research Council Memorandum No. 20. (Great Britain) London. H.M.S.O.
Ministry of Education. (1945)	Handicapped Pupils and School Health Service Regulations. Statutory Rules and Orders No.1076.
Ministry of Labour and National Service. (1954)	Unpublished personal communication.
Registrar General. (1955)	Statistical Review of England and Wales for the year 1952. Text volume. London. H.M.S.O. Page 108.
Registrar General. (1955)	Statistical Review of England and Wales for the two years 1950 and 1951. Supplement on General Morbidity, Cancer and Mental Health. London. H.M.S.O. Page 151.
Stewart, A.M., Webb, J.W. & Hewitt, D. (1955a)	Brit. J. Soc. & Prev. Med. 9, 19.
Stewart, A.M., Webb, J.W. & Hewitt, D. (1955b)	Brit. J. Soc. & Prev. Med. 9, 26.
Stewart, A.M., Webb, J.W. & Hewitt, D. (1955c)	Brit. J. Soc. & Prev. Med. 9, 97.
Stocks, P. (1949)	Sickness in the Population of England and Wales in 1944-7. Studies in Medical and Population Subjects. No. 2. General Register Office. (Great Britain) London. H.M.S.O. Page 28.
Webb, J.W. (1955)	Proc. Roy. Soc. Med. 48, 658.